

Environmentally Preferable Coatings For Structural Steel

Completed Technology Project (2011 - 2016)



Project Introduction

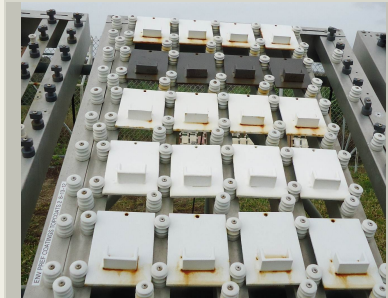
The Ground Systems Development and Operations (GSDO) Program at NASA John F. Kennedy Space Center (KSC) has the primary objective of modernizing and transforming the launch and range complex at KSC to benefit current and future NASA programs along with other emerging users. Described as the "launch support and infrastructure modernization program" in the NASA Authorization Act of 2010, the GSDO Program will develop and implement shared infrastructure and process improvements to provide more flexible, affordable, and responsive capabilities to a multi-user community. In support of the GSDO Program, the objective of this project is to determine the feasibility of environmentally friendly corrosion resistant coatings for launch facilities and ground support equipment.

NASA is responsible for a number of facilities/structures with metallic structural and non-structural components in a highly corrosive environment. Metals require periodic maintenance activity to guard against the insidious effects of corrosion and thus ensure that structures meet or exceed design or performance life. The standard practice for protecting metallic substrates in atmospheric environments is the application of corrosion protective coating system. These coating systems work via a variety of methods (barrier, galvanic and/or inhibitor) and adhere to the substrate through a combination of chemical and physical bonds.

Maintenance at KSC is governed by NASA-STD-5008B (*Protective Coating of Carbon Steel, Stainless Steel, and Aluminum on Launch Structures, Facilities, and Ground Support Equipment*), which establishes practices for the protective coating of launch facilities used by or for NASA programs and projects. The Standard is also recommended guidance for all NASA Centers and is for the design of non-flight hardware used to support the operations of receiving, transportation, handling, assembly, inspection, test, checkout, service, and launch of space vehicles and payloads at NASA launch, landing, or retrieval sites. The criteria and practices contained within the Standard may be applied to items used at the manufacturing, development, and test sites upstream of the launch, landing, or retrieval sites.

NASA-STD-5008B includes an "Approved Products List" (APL) of coatings that have previously been tested and qualified for use. The APL, however, includes coatings that have very high volatile organic compound VOC levels which are no longer compliant with current environmental regulations. Some contain other hazardous constituents that are also subject to regulation. The limited number of approved coatings in NASA-STD-5008B presents an obsolescence risk to NASA if materials should become unavailable.

This project will identify and qualify environmentally preferable coating alternatives to determine whether they provide adequate corrosion protection along with other properties such as material compatibility and adhesion for use on NASA ground-based space infrastructure.



Test coupons exposed to the elements at KSC Corrosion site

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Organizational Responsibility

Responsible Mission Directorate:

Exploration Systems Development Mission Directorate (ESDMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

Exploration Ground Systems

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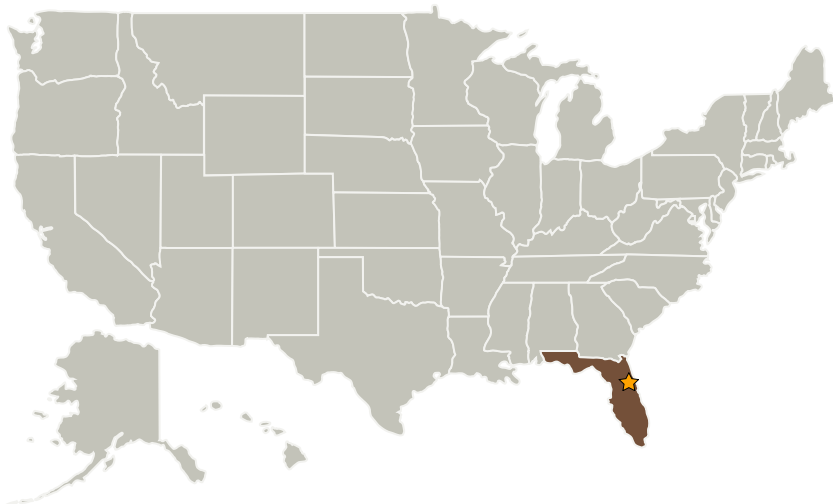
This study will continue through FY 2016 and will include testing for adhesion, compatibility, removability/reparability, and flexibility. Test team members continue to identify other coatings to include in the next round of testing.

Anticipated Benefits

This project could provide NASA with the following benefits:

- Eliminate risks associated with material obsolescence (limited number of coatings on APL).
- Reduce environmental, safety, and health concerns of VOCs, hazardous air pollutants, and other hazardous materials.
- Improve coating performance results in less required maintenance (less down-time), reduced costs, and improved mission readiness.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida

Primary U.S. Work Locations

Florida

Project Management

Program Managers:

Thomas D Whitmeyer
Michael J Bolger

Project Manager:

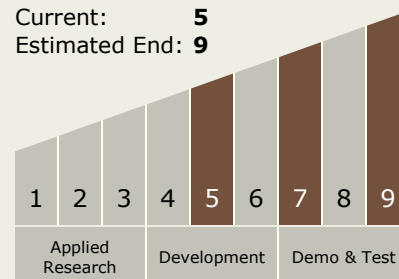
Joni M Richards

Principal Investigator:

Brian E Greene

Technology Maturity (TRL)

Start: 7
Current: 5
Estimated End: 9



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.1 Materials
 - └ TX12.1.5 Coatings

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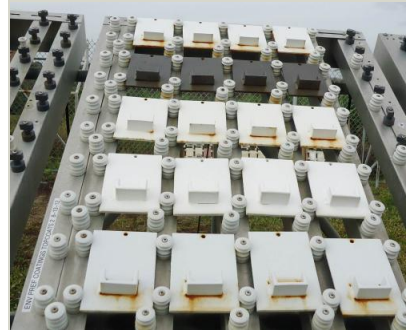


Images



Applying alternative to coupon for testing

Applying alternative to coupon for testing
(<https://techport.nasa.gov/image/1893>)



Test coupons exposed to the elements at KSC Corrosion site

Test coupons exposed to the elements at KSC Corrosion site
(<https://techport.nasa.gov/image/1895>)